

CAVES AND WATERWAYS.

La Spéléologie au XX^e Siècle. By E. A. Martel. Tome vi. of *Spelunca*. (Paris: Société de Spéléologie, 1906.)

THE completion of this volume deserves separate mention. Its 800 pages contain a critical review by M. Martel of practically all papers bearing on caves published in the last six years. Since these papers, in their turn, refer to a large amount of earlier work, we have here a complete exposition of what is at present known of 'spelæology.' We pointed out, when noticing one of the separate parts, how the editor's comments render the abstracts readable and illuminating. The papers have been classified, for the most part geographically, and the volume becomes practically an unconventional text-book of the lore of caves. The range of subject permitted may here and there raise a smile; but it dies away in admiration of M. Martel's energy. Marcellin Boule, for instance, is cited on p. 694 as describing a lava-flow in Auvergne intermediate in age between the epoch of the mammoth and that of the reindeer. On p. 727, again, we read how a cave near Sévérac-le-Château—and memories of cause and cañon are recalled by the very name—was discovered in 1902 to contain a chapel, with accessories brought there during the persecution of the Catholic priests in 1793. A moment's reflection shows us that both references may prove of value. Traces of man among French volcanic deposits need not be regarded as of the Pliocene age. The occurrence of religious emblems in caves may be due as much to a desire for secrecy as to the association of the cave itself with any form of ceremony. It is thus hard to think of any worker in anthropology or natural history who would not gain information from M. Martel's aid. The alleged glacial deepening of Alpine valleys, and the formation of *cluses*, are discussed on p. 526. Even writers on radio-activity may learn something from the notes on subterranean waters on pp. 610-612. To most readers, the gradual growth of our knowledge regarding the incised drawings and paintings on the roofs and walls of caves (pp. 654-705) will prove of surpassing interest. M. Martel presses home his contention that the bold representations of animals, sometimes amazingly faithful, are records or trophies of the chase.

Three photographic illustrations are given of paintings in the cave of Altamira, near Santander, which Martel himself has visited. Cartailhac (p. 703) records how the discovery of these was made by a child, in the company of less observant scientific excavators. Alcalde del Rio (p. 704), in a paper published in 1906, mentions, in the cave of Hornos de la Peña, "a figure in a human attitude, but apparently an ape." M. Martel adds that it has a tail; but why does he suggest, on p. 706, that M. Piette's "être de caractère simiesque," engraved on a bone, is "probablement imaginaire"? Surely the Neolithic or even earlier artists, who saw so much that was wonderful and worth reproducing in the animal world around them,

had hardly yet risen, or descended, to the consciously imaginary and grotesque?

M. Piette has himself sent us a paper on "Fibules pléistocènes" (*Revue préhistorique*, 1906, p. 1), in which he writes confidently as to his anthropoid from Mas-d'Azil. He describes also a pendant ornament of incised reindeer-horn from Gourdan, on which a similar erect anthropoid, this time tailless, is clearly shown. The figures which he publishes are of immense interest; and M. Martel will doubtless note them in a future volume of *Spelunca*. Though "spelæologists" cannot be allowed to found a science of their own, geologists, zoologists, anthropologists, and historians may well hope to link a friendly arm in theirs.

GRENVILLE A. J. COLE.

OUR BOOK SHELF.

Die chemische Energie der lebenden Zellen. By Prof. Oscar Loew. Second edition. Pp. viii+133. (Stuttgart: Fr. Grub, 1906.) Price 3 marks.

THE great part played by the proteins in building up living cells has resulted in the ascription by physiologists to these substances of an indispensable rôle in vital processes. If, however, protoplasm be regarded as a protein molecule, the difficulty at once arises how to account for the great differences in stability between the living and the dead protein. This difficulty Pflüger, as well as Loew, attempts to get over by assuming a different constitution for the protein in the living body from that which is familiar to us in the dead protein as analysed in the laboratory. Whereas, however, Pflüger ascribed the lability of the living protein to the presence of cyanogen groups, which underwent transformation to amino-groups, Loew explains the difference by assuming the simultaneous presence in the plasma protein of aldehyde and amino-groups, basing his hypothesis largely on the fact that the cells of certain vegetable organisms give a black reaction with dilute ammoniacal silver only so long as they are alive, the reaction failing when the cells have been killed by heat, acids, or alcohol.

This blackening Loew and Bokorny assumed to be due to the presence of a reserve protein of special character, allied in the grouping of its constituent molecules to that which obtains in the living protoplasm.

In the present book, the first edition of which appeared in 1898, the author examines the behaviour of living cells, the nature of their work, and the assimilation of food-stuffs in the light of his theory. The great amount of work which has been carried out of late years by Kossel, Fischer, and their pupils on the constitution of the protein molecule, which has resulted in the separation of a large number of approximate principles, all distinguished by the possession of amino-groups, Loew dismisses with the airy suggestion that, during the action of the hydrolytic agents, acids or trypsin, a shifting of the intramolecular groups has taken place, with the result that the amino-acids, &c., obtained at the end of the hydrolysis cannot be assumed to throw any light on the structure of the protein molecule itself. Since in the plant organism it is probable that protein is formed from formaldehyde and ammonia by a process of polymerisation, the author imagines that the resulting product, in consequence of the presence of numerous aldehyde and amino-groups, must form a

molecule of extraordinary lability. The first product of such polymerisation, which might be, as the author suggests, the aldehyde of aspartic acid, would further condense so as to form a body having the formula ascribed by Lieberkuhn to the simplest protein. This substance, "primitive peptone," by polymerisation of two molecules might form albumoses, and by the union of three molecules might form albumen.

Although the facts brought together by the author are interesting, and although we must grant the possibility of aldehyde groups existing in some parts of the protein molecule, and perhaps being responsible for some of the chemical interactions which occur in the living cell, the new facts brought forward are too trivial effectively to modify our opinion on the structure of the protein molecule, which is based on the solid work of Fischer and his pupils.

La Découverte de l'Anneau de Saturne par Huygens. By Jean Mascart. Pp. 58. (Paris: Gauthier-Villars, 1907). Price 2 francs.

IN this small volume of 58 pages M. Mascart tells the history of the discovery of Saturn's rings from the time of Galileo's dramatic anagram concerning the *altissimam planetam*, and his subsequent tragic disappointment and despair, to the time when, after many questionings and discussions, Huygens finally established his accepted theory. This history is most interesting, and includes a number of extracts from Huygens's correspondence on the subject, showing us how he had to fight for the acceptance of his theory and then had to fight again for the vindication of his priority in the matter. The numerous reproductions of original drawings by Gassendi, Hévelius, Riccioli, Huygens, Wallis, and others give an additional interest to the work, which is concluded by a lucid recapitulation of the later theories, such as that of Otto Struve, and discoveries concerning Saturn's unique appendage.

W. E. R.

German Science Reader. Part i. Mathematics, Physics, and Chemistry. Compiled by C. R. Dow. Pp. 85. (London: J. M. Dent and Co., 1906.) Price 2s.

TWENTY pages of this book are devoted to mathematics, twenty-three to physics, nineteen to chemistry, and the remainder to a vocabulary of words not usually found in elementary class-books of German. The mathematical portion is a synopsis of principles of mathematics with enunciations of problems, while the two remaining sections consist of definitions and descriptions of some physical and chemical properties of matter. Any student of science who has an elementary knowledge of the German language should be able to read the book with the aid of the vocabulary, and the task would be more to his taste than reading or translating Grimm's or Andersen's fairy-tales. No grammatical rules are given, as instruction in these is assumed to have been obtained in an earlier course.

Céruse et Blanc de Zinc. By M. G. Petit. Pp. 154. *Préparation mécanique des Minerais. Résumé pratique.* By F. Rigaud. (Paris: Gauthier-Villars and Masson et Cie., n.d.)

BOTH these volumes are publications in the now well-known "Encyclopédie Scientifique des Aide-Mémoire." The first deals with the preparation and use in painting of white lead and zinc white respectively. The second book provides a practical account of the various processes in use for the mechanical preparation of ores by separating them from their stony matrix.

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LETTERS TO THE EDITOR.

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The Ballot-Box.

IN reference to the weight-judging competition, Mr. Galton says that "the average competitor was probably as well fitted for making a just estimate of the dressed weight of the ox as an average voter is of judging the merits of most political issues on which he votes." These competitions are very popular in Cornwall; but I do not think that Mr. Galton at all realises how large a percentage of the voters—the great majority, I should suspect—are butchers, farmers, or men otherwise occupied with cattle. To these men the ability to estimate the meat-equivalent weight of a living animal is an essential part of their business; and, as an instance of their training, I may mention that one of the butchers here has a son under thirteen years of age who is an adept at this work, and is already, I am told, one of the best weight-judges in the district. This boy has been trained to it by his father, and already surpasses his instructor. Moreover, many of the competitors doubtlessly compete frequently, compare notes afterwards, and correct future estimates by past experience. Now the point of all this is that, in so far as this state of things prevails, we have to deal with, not a *vox populi*, but a *vox expertorum*. I am afraid that the majority of such competitors know far more of their business, are far better trained, and are better fitted to form a judgment, than are the majority of voters of any party, and of either the uneducated or the so-called "educated" classes. I heartily wish that the case were otherwise.

F. H. PERRY-COSTE.

Polperro, Cornwall, March 21.

I INFERRED that many non-experts were among the competitors, (1) because they were too numerous (about 800) to be mostly experts; (2) because of the abnormally wide vagaries of judgment at either end of the scale; (3) because of the prevalence of a sporting instinct, such as leads persons who know little about horses to bet on races. But I have no facts whereby to test the truth of my inference. It would be of service in future competitions if a line headed "Occupation" were inserted in the cards, after those for the address.

FRANCIS GALTON.

MR. HOOKER, in NATURE of March 21, seems not to have quite appreciated my principal contention in the letters "One Vote, One Value" and "Vox Populi" of February 28 and March 7 respectively. It was to show that the verdict given by the ballot-box *must* be the Median estimate, because every other estimate is condemned in advance by a majority of the voters. *This being the case*, I examined the votes in a particular instance according to the most appropriate method for dealing with medians, quartiles, &c. I had no intention of trespassing into the technical and much-discussed question of the relative merits of the Median and of the several kinds of Mean, and beg to be excused from not doing so now except in two particulars. First, that it may not be sufficiently realised that the suppression of any one value in a series can only make the difference of one half-place to the median, whereas if the series be small it may make a great difference to the mean; consequently, I think my proposal that juries should openly adopt the median when estimating damages, and councils when estimating money grants, has independent merits of its own, besides being in strict accordance with the true theory of the ballot-box. Secondly, Mr. Hooker's approximate calculation from my scanty list of figures, of what the mean would be of all the figures, proves to be singularly correct; he makes it 1196 lb. (which is the mean of the deviates at 5°, 15°, 95°), whereas it should have been 1197 lb. This shows well that a small *orderly* sample is as useful for calculating means as a very much larger *random* sample,